Section 6

Keeping Food Safe in Storage



TEST YOUR FOOD SAFETY KNOWLEDGE

1. True or False: Potentially hazardous, ready-to-eat food stored in

refrigeration at 41°F (5°C) must be discarded if not

used within three days of preparation.

(See page 6-3.)

2. True or False: Cleaning chemicals may be transferred to sturdy,

clearly labeled containers. (See page 6-11.)

3. True or False: Freezing destroys all harmful microorganisms in

food. (See page 6-6.)

4. True or False: Raw chicken should be stored below ready-to-eat

food such as pumpkin pie if it is stored in the same

walk-in refrigerator. (See page 6-4.)

5. True or False: If stored food has passed its expiration date, you

should lower the price and mark it as a sale item.

(See page 6-3.)

For answers, please turn to Appendix A.

Learning Essentials

After completing this section, you should be able to

- Label and store specific types of refrigerated food.
- Label and store frozen food.
- Properly store dry and canned food.
- Apply first in, first out (FIFO) practices.
- Properly store raw food to prevent cross-contamination.
- Properly transfer food from original containers to storage containers.
- Follow the proper procedures for using refrigerators, freezers, and drystorage areas.

CONCEPTS

- Dry storage: Storage used to hold dry and canned food at temperatures between 50°F and 70°F (10°C and 21°C) and at a relative humidity of 50 to 60 percent.
- **First in, first out (FIFO):** A method of stock rotation in which products are shelved based on their use-by or expiration dates, so oldest products are used first. Products with the earliest use-by or expiration dates are stored in front of products with later dates.
- **Frozen storage:** Storage typically designed to hold food at 0°F (-18°C) or lower. Some food requires a different temperature.
- **Hygrometer:** An instrument used to measure the relative humidity in a storage area.
 - **Refrigerated storage:** Storage used for holding potentially hazardous food at an internal temperature of 41°F (5°C) or lower. (Some jurisdictions allow food in refrigerators to be held at an internal temperature of 45°F [7°C] or lower. Check with local regulatory agency for specific regulations.)
- Shelf life: Recommended period of time during which food can be stored and remain suitable for use.

GENERAL STORAGE GUIDELINES

Supermarkets are in the business of storing food. How and where they store the food their customers will buy affects its quality and safety. When food is stored improperly, quality and safety suffer. Poor storage practices can cause food to spoil quickly, decreasing the shelf life of the product and potentially leading to dangerous situations.

The general guidelines applied to storing food in supermarkets apply to stocking shelves, coolers, cases, and merchandising products. These principles also apply to cross-merchandising.

- Storage areas should be positioned to prevent contamination. Food should be stored away from warewashing areas and garbage rooms. Storage areas should be accessible to receiving, food-preparation, and cooking areas to help ensure food safety.
- Keep potentially hazardous food out of the temperature danger zone.
- Follow the first in, first out (FIFO) method. Note the contents on each package. Shelve food based upon use-by or expiration dates, so older food is used first. For example, in deli or bakery department self-service cases, older items are placed in the front where customers will choose them first.

In full-service cases, older products should be placed in the back, toward the doors, so department employees will use them first when serving customers. Regularly check expiration dates and discard food that has exceeded its expiration date.

O All potentially hazardous, readyto-eat food stored in refrigeration should be discarded if not used within seven days of the original container being opened or of food preparation. Potentially hazardous, ready-to-eat food that has been frozen should be discarded if not consumed within twenty-four hours of being thawed.

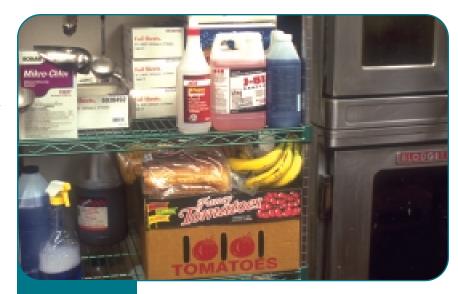


Exhibit 6a

Improper Storage
Never store food near chemicals or cleaning supplies.

- Check temperatures of stored food and storage areas regularly. Use a calibrated thermometer to check temperatures at the beginning of the shift.
- Store food only in designated storage areas. Do not store food products near chemicals or cleaning supplies. (See Exhibit 6a.)
- O Keep all storage areas clean and dry.
- Clean the carts or other vehicles that transport food. Never use shopping carts to transport food.
- Transfer food between containers properly. If you take food out of its original package, put it in a leak-proof, sanitary container with a tight-fitting lid. Label the new container with the date the package was opened, its contents, and the expiration date of the product. All potentially hazardous, ready-to-eat food should be labeled with the date it should be sold, consumed, or discarded by. Never use empty food containers to store chemicals or put food in empty chemical containers. If it is necessary to transfer chemicals, store them in sturdy containers clearly labeled with the contents and their hazards.
- Credit areas must be clearly marked. Food returned for credit should be kept separate from retail food items.



Exhibit 6b

Monitoring Food Temperatures

Randomly sample the internal temperature of refrigerated food using a calibrated thermometer.

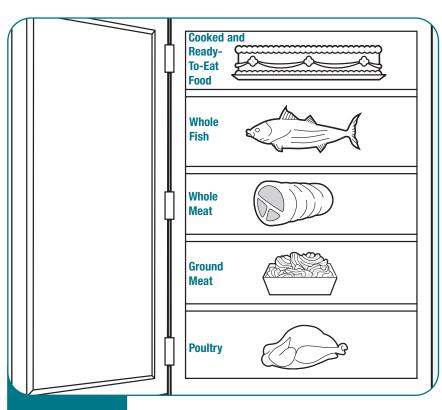


Exhibit 6c

Refrigerator Storage

Top-to-bottom storage of different raw food in the same refrigerator.

Refrigerated Storage

The following guidelines should be followed when you put food into refrigerated storage.

- Monitor food temperature
 regularly. Randomly sample the
 temperature of the food stored inside
 with a calibrated thermometer.
 (See Exhibit 6b.) You may also want
 to monitor food temperatures using
 a product-mimicking device.
- Overload the refrigerator.

 Overloading may prevent airflow and make the unit work harder to stay cold. Don't line the shelving with foil or paper. This will also prevent airflow.
- Never place hot food in the refrigerator. This could warm the interior enough to put other food in the temperature danger zone.
 Keeping the refrigerator door closed as much as possible will also help keep the interior cold.
- Store raw meat, poultry, and fish separately from cooked and ready-to-eat food to prevent cross-contamination. If they can't be stored separately, store prepared or ready-to-eat food above raw meat, poultry, and fish. Raw meat, poultry, and fish should be stored in the following top-to-bottom order in the refrigerator: whole fish, whole cuts of beef, ground meat and ground fish; whole and ground poultry. (See Exhibit 6c.)



Exhibit 6d Stack Cases Properly

Monitor cases to ensure that product is not stored above or outside load lines.

- Don't stack product above or outside load lines. Manufacturers do not guarantee that proper temperatures can be maintained for products stacked above or outside load lines. (See Exhibit 6d.)
- To hold food at a specific internal temperature, the air temperature in the refrigerator usually must be about 2°F (1°C) lower. For example, to hold chicken at an internal temperature of 41°F (5°C) the air temperature must be 39°F (4°C). Use hanging thermometers in the warmest part of the unit and check them for accuracy.
- O Be sure condensation from refrigeration coils does not drip on food.



Exhibit 6e Labeling System

There are several products on the market that help simplify the labeling process.

• Wrap food properly. Leaving food uncovered can cause crosscontamination. Products should be stored in clean, covered containers clearly marked. (See Exhibit 6e) All potentially hazardous food should be labeled with the date it should be sold, consumed, or discarded by.

Frozen Storage

Frozen-storage areas are typically designed to hold food at 0°F (-18°C). Some frozen food, however, may require a different temperature. Freezing does not kill microorganisms. However it does slow their growth substantially. When storing food in freezers, you should follow these guidelines.

- Check unit and food temperatures regularly.
- O Rotate frozen food using the FIFO method. Check use-by dates.
- Store food in its original package. If food is removed from its packaging, wrap it in moisture-proof material or place it in a cleaned and sanitized container. Clearly label all packages and containers, identifying the contents, delivery date, and/or use-by date.
- Use caution when placing food into a freezer. Warm food may raise the temperature inside the unit and partially thaw the food inside.
- Never refreeze thawed food until it has been thoroughly cooked.
 Thawed food is more likely to support the growth of microorganisms.
- Keep the unit closed as much as possible.
- O Defrost freezers regularly. Move food to another freezer while defrosting.

Dry Storage

You should follow these guidelines when placing food in dry storage.

• **Keep dry-storage areas cool, dry, and well-ventilated.** Moisture and heat are the biggest dangers to dry and canned food. The temperature of the storeroom should be between 50°F and 70°F (10°C to 21°C). Keep relative humidity at 50 to 60 percent if possible. Use a hanging thermometer to measure temperatures and a hygrometer to record relative humidity.

- Store food in its original package, if possible. Once the package has been opened, store the product in a tightly covered container that is clearly labeled. (See Exhibit 6f.)
- Store dry food at least six inches off the floor and away from walls.
 Keep dry food out of direct sunlight.

STORING SPECIFIC FOOD

The general storage guidelines provided in this section apply to most food. However, some food has specific requirements.

Meat

- Store meat immediately after delivery in its own storage unit or in the coldest part of the refrigerator. Fresh meat must be held at an internal temperature of 41°F (5°C) or lower.
 Frozen meat should be stored at a temperature that will keep it frozen.
- Wrap raw cuts of meat, especially ground beef, so they are airtight. Meat will turn brown when exposed to air. Frozen meat should be wrapped in airtight, moisture-proof material or placed in containers to prevent freezer burn. (See Exhibit 6g.)
- Primal cuts, quarters or sides of raw meat, and slab bacon can be hung on clean, sanitized hooks or can be placed on sanitized racks. To prevent cross-contamination, do not store meat above any other food.
- Throw out any meat showing signs of spoilage.

Poultry

- Store raw, fresh poultry at an internal temperature of 41°F (5°C) or lower.
 Frozen poultry should be stored at temperatures that will keep it frozen.
 If it has been removed from its original packaging, place it in airtight containers or wrap it in airtight material.
- Ice-packed poultry can be stored in a refrigerator as is. Containers must be self-draining. Change the ice and sanitize the container often.



Exhibit 6f

Proper Storage

The expiration date, date product was received, or date product was stored should be written on each package.



Wrap Meat
Raw cuts of meat should
be wrapped so they
are airtight.



Fish

- Store fresh fish at an internal temperature of 41°F (5°C) or lower.
 Wrap cuts of fish so they are airtight.
 Use moisture-proof materials. (See Exhibit 6g.) Fresh, whole fish can be packed in flaked or crushed ice, and ice beds must be self-draining. Change the ice and sanitize the container regularly.
- Store frozen fish at temperatures that will keep it frozen. Wrap fish in moisture-proof packaging.
- Fish that will be eaten raw or partially cooked should be frozen by the processor, as follows, prior to shipment to kill any parasites that may be present.
- are airtight.

• Fish should be frozen by the processor at:

Raw cuts of fish should be wrapped so they

- -4°F (-20°C) or lower for seven days (168 hours) in a storage freezer; or
- -31°F (-35°C) or lower for fifteen hours in a blast freezer
 The only exceptions are shellfish and certain species of tuna not susceptible to parasites. Ask your suppliers whether the fish you purchase meet these conditions.

Shellfish

- O Store live shellfish in their containers at an internal temperature of 45°F (7°C) or as low as 35°F (2°C). You can store molluscan shellfish (clams, oysters, mussels, scallops) in a display tank under one of two conditions:
 - The tanks carry a sign stating that the shellfish are for display only
 - You obtain a variance from the health department to serve the shellfish on display
- To obtain a variance, you must submit a HACCP-based plan showing the following:
 - Water in the tank will not come into contact with any other fish
 - Using the tank won't affect product quality or safety
 - You retain shellstock identification tags as required
 - Shellfish (shucked or shellstock) may be removed from their original containers and displayed on drained ice or held in a display container as long as the shellstock identification tags are kept on file for the required amount of time.

Eggs

- Eggs received at an ambient (air) temperature of 45°F (7°C), in compliance with laws governing their shipment from suppliers, must be placed immediately upon their receipt in refrigeration equipment capable of maintaining food at an ambient (air) temperature of 45°F (7°C) or lower. Maintain constant temperature and humidity levels in refrigerators used to store eggs. Do not wash eggs before storing them since they are washed and sanitized at the packing facility.
- Use the FIFO method of storage. Plan to use all eggs within four to five weeks of the packing date.
- Keep shell eggs in cold storage right up until the time they are used. Take out only as many eggs as are needed at one time.
- Do not combine cracked eggs in a bowl (pool them) unless you intend to use them right away.
- Store frozen eggs at temperatures that will keep them frozen.
- Refrigerated liquid egg products should be stored in their original containers at 41°F (5°C) or lower. Do not freeze.
- Oried egg products can be stored in a cool, dry storeroom away from light. Storing them in a refrigerator is best. Once they are reconstituted (mixed with water), store them in the refrigerator at 41°F (5°C) or below.

Dairy Products

- O Store dairy products at a temperature of 41°F (5°C) or lower.
- Frozen dairy products such as ice cream and frozen yogurt can be stored at a temperature of 6°F to 10°F (-14°C to -12°C).
- Dairy products used for cooking should not be held at room temperature longer than two hours. They can sour quickly. Like all potentially hazardous food, dairy products must be thrown away if they have been in the temperature danger zone for more than four hours. Do not put products that have been held at room temperature back into refrigeration.
- Cream and custard fillings should be refrigerated when not being used.
- Always use the FIFO method of storage. Discard products if they have passed their use-by or expiration dates.

Fresh Produce

Fruit and vegetables have various temperature requirements for storage.
 While many whole, raw fruit and vegetables can be stored at 41°F (5°C) or lower, not all will be stored at these temperatures. Whole, raw produce and raw, cut vegetables—such as celery, carrots, and radishes—delivered

- packed in ice can be stored that way. The containers must be self-draining, and ice should be changed regularly.
- Fruit and vegetables kept in the refrigerator can dry out quickly. Keep the relative humidity at 85 to 98 percent.
- Though most produce can be stored in the refrigerator, avocados, bananas, pears, and tomatoes ripen best at room temperature.
- Produce should not be washed before storage. Moisture promotes the growth of mold in many instances. Instead, wash produce before preparing or serving it.
- Store whole citrus fruit, hard-rind squash, eggplant, and root vegetables—such as potatoes, sweet potatoes, rutabagas, and onions—in a cool, dry storeroom. Temperatures of 60°F to 70°F (16°C to 21°C) are best. Make sure containers are well ventilated. Store onions away from other vegetables that might absorb odor.

MAP, Vacuum-Packed, and Sous Vide Food

- Always store MAP, vacuum-packed, and sous vide food at temperatures recommended by the manufacturer. Most should be stored at 41°F (5°C) or lower. Frozen MAP, vacuum-packed, and sous vide food should be stored at temperatures that will keep them frozen. Store and handle these products carefully.
- Vacuum packaging will not stop the growth of anaerobic microorganisms.
 MAP fish, for example, is especially susceptible to the growth of *Clostridium botulinum*. Discard product if the package is torn or slimy, if it contains excessive liquid, or if the product bubbles, indicating the possible growth of *Clostridium botulinum*.
- Always check the expiration date before using MAP, vacuum-packed, and sous vide products. Labels should clearly list contents, storage temperature, preparation instructions, and a use-by date.
- Operators who produce MAP food on site must follow specific labeling rules. The FDA rules for processing MAP food on site are very strict.

UHT and Aseptically Packaged Food

- Food that has been pasteurized at ultra-high temperatures (UHT) and aseptically packaged (the packaging is free of microorganisms) can be stored at room temperature. Since much of this food, such as milk and pudding, are served cold, you might want to store them in the refrigerator.
- Once it is opened, store UHT and aseptically packaged food in the refrigerator at 41°F (5°C) or lower.

 UHT products not aseptically packaged must be stored at an internal temperature of 41°F (5°C) or lower.

Canned Goods

- Store canned goods and other dry food at a temperature between 50°F and 70°F (10°C to 21°C). Even canned food spoils over time. Higher storage temperatures may shorten shelf life. Acidic food such as canned tomatoes does not last as long as food low in acid. The acid can also form pinholes in the metal over time.
- Keep storerooms dry. Too much moisture will cause cans to rust.
- Wipe cans clean with a sanitized cloth towel before opening them to help prevent dirt from falling into the contents of the can.

Dry Food

- Keep flour, cereal, and grain products such as pasta or crackers in airtight containers. They can quickly become stale in a humid room and can become moldy if there is too much moisture.
- If dry food is removed from its original packaging and stored in containers, these containers should be clearly labeled. Many foods, such as salt and sugar, or flour and baking mixes, often look alike.
- Before using dry food, check containers or packages for damage from insects or rodents. Cereal and grain products are favorite targets for these pests.
- Salt and sugar, if stored in the right conditions, can be held almost indefinitely.
- Pet food should be displayed in nonfood areas. Damaged packaging should be removed promptly from display areas and any spills cleaned up immediately.

Chemicals

- Never use empty food containers to store chemicals, and never put food in empty chemical containers. Keep chemicals in their original containers.
 If it is necessary to transfer chemicals, store them in sturdy containers clearly labeled with the contents and their hazards.
- Store chemicals and cleaning supplies away from food-storage and preparation areas. Keep the area locked, if possible.

Shelf Life of Food

- Pay close attention to each food's use-by date. Discard any food that has exceeded this time period.
- All potentially hazardous, ready-to-eat food stored in refrigeration at 41°F (5°C) should be discarded if not consumed within seven days of preparation. Potentially hazardous, ready-to-eat food that has been frozen should be discarded if not consumed within twenty-four hours of being thawed.

SUMMARY

When food is stored improperly, quality and safety will suffer. Though different food has different storage needs, some commonsense rules apply. Food should be stored in designated areas using the FIFO method. Store food in its original packaging, or in cleaned and sanitized food containers with tight-fitting lids. Wrap food in clean, moisture-proof materials. Always label potentially hazardous, ready-to-eat food with date it should be sold, consumed, or discarded by. Check the temperature of stored food and the storage area regularly, and keep these areas clean and dry to prevent cross-contamination.

Hold potentially hazardous food in storage areas refrigerated at 41°F (5°C) or lower, temperatures which slow the growth of microorganisms. To hold food at the proper temperature, keep the air temperature of the unit approximately 2°F (1°C) lower than the desired food temperature. Never place hot food in the refrigerator, which could raise the temperature inside. Don't line refrigerator shelves, overload the unit, or open the door too often. Don't stack product above or outside load lines. Manufacturer's do not guarantee proper temperatures can be maintained for products stacked above or outside load lines. If possible, raw meat, poultry, and fish should be stored *separately* from cooked and ready-to-eat food to prevent cross-contamination. If not, store these items below cooked or ready-to-eat food in the appropriate order.

While freezing does not kill microorganisms, it does slow their growth substantially. Freezers should be kept at 0°F (-18°C) or lower unless the food being stored requires a different temperature. Unit and food temperatures should be checked often. Dry-storage areas should be kept at the appropriate temperature and humidity levels and should be clean and well ventilated to maintain food quality. Food in dry storage should be stored at least six inches off the floor and away from walls. Foodservice chemicals should be kept in their own storage area, away from food and food-preparation areas. Empty food containers should never be used to store chemicals. Chemicals

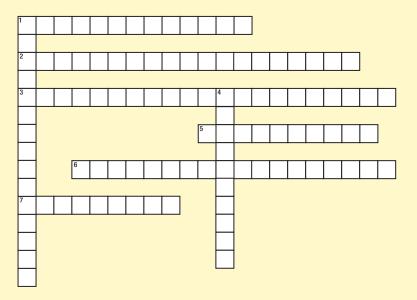
should be kept in their original containers or in sturdy containers that have been clearly marked with the contents and their hazards.

Fresh meat, poultry, fish, and dairy products should be stored at 41°F (5°C) or lower. Fish and poultry can be stored under refrigeration in crushed ice as long as the containers are self-draining, the ice is changed, and the container is sanitized regularly. Eggs should be stored or displayed at an ambient (air) temperature of 45°F (7°C) or lower right up until they are used, and should not be pooled unless they will be used immediately. Shellfish should be stored in their original containers at 45°F (7°C). Fresh produce has various temperature requirements for storage. Produce should not be washed before storage, because it can promote mold growth. MAP, vacuum-packed, and *sous vide* food should be stored at temperatures recommended by the manufacturer. Packages should be checked for signs of contamination, including bubbling, excessive liquid, and torn or slimy packaging. Once opened, UHT and aseptically packaged food should be stored in the refrigerator at 41°F (5°C) or lower. Dry and canned food should be stored at temperatures between 50°F and 70°F (10°C to 21°C).

Crossword Puzzle

Across

- 1. Type of storage typically used to hold food at 0°F (-18°C).
- 2. Type of storage used to hold potentially hazardous food at an internal temperature of 41°F (5°C) or lower.
- 3. Temperature range within which most bacteria reproduce and grow.
- 5. Instrument used to measure the relative humidity in a storage area.
- 6. Can result from storing raw food above cooked or ready-to-eat food.
- 7. Recommended period of time during which a material may be stored and remain suitable for use.



Down

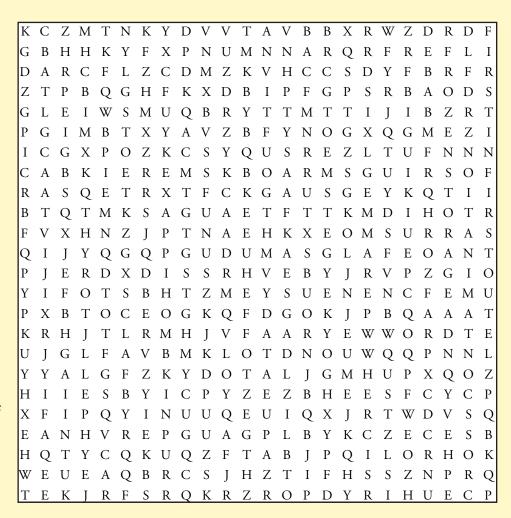
- 1. Method of stock rotation in which the products with the earliest use-by or expiration dates are used first.
- 4. Type of storage used to keep food at 50°F to 70°F (10°C to 21°C) and 50 to 60 percent humidity.

Word Find

Find the terms that go with the clues below.

Clues

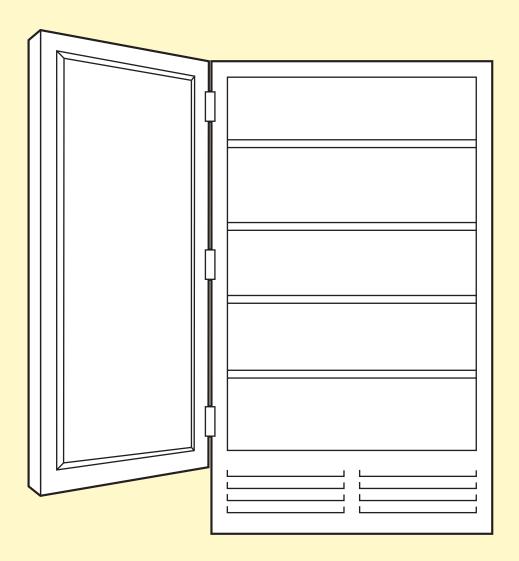
- 1. Temperature range within which most bacteria reproduce and grow.
- 2. Type of storage used to hold potentially hazardous food at an internal temperature of 41°F (5°C) or lower.
- 3. Type of storage typically used to hold food at 0°F (-18°C).
- 4. Type of storage used to keep food at 50°F to 70°F (10°C to 21°C) and 50 to 60 percent humidity.
- 5. Method of stock rotation in which the products with the earliest use-by or expiration dates are used first.
- Can result from storing raw food above cooked or ready-to-eat food.



- 7. Instrument used to measure the relative humidity in a storage area.
- 8. Recommended period of time during which a material may be stored and remain suitable for use.

Load the Refrigerator

Properly store each item in the refrigerator by drawing a line from the food item to the proper refrigerator shelf.





Whole, raw meat



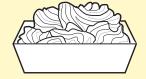
Cooked and ready-to-eat food



Raw poultry



Whole, raw fish



Raw, ground meat

What's Wrong with This Picture?

How many food storage problems can you find?



A CASE IN POINT

Ellen, the assistant store director of Moore's Supermarket, was working the evening shift. The dinner rush was over and Ellen decided to walk the store. Walking along the dairy case, Ellen noticed two cases of yogurt sitting on the floor. There were no dairy department associates in the area, so Ellen stacked the yogurt containers on the shelves wherever she could find space. Later, she found a six-piece chicken dinner on a shelf in the cereal aisle. She picked it up and decided she would put it back in the deli where it belonged. On her way to the deli, Ellen was paged to handle a customer complaint at a check out. After taking care of the customer, Ellen went to the deli to return the chicken dinner and discovered a hot-holding case that had been turned off for the evening, but still contained three trays of food. Ellen turned the case back on and put the chicken dinner back with the other dinners in the hot-display case. On her way through the bakery, Ellen found that four cases of cleaning supplies had been delivered to the back room. They were on one of the worktables on which a bakery associate was repackaging day-old bakery items. She said, "Don't forget to put those cleaning supplies away when you're finished." The bakery associate replied, "Sure thing." Ellen continued back to the customer service center to check out the front end. What did Ellen do wrong? What should she have done differently? What are the possible consequences?

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